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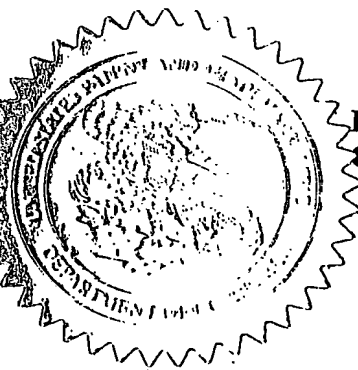
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APPLICATION NUMBER: 60/459,655

FILING DATE: April 02, 2003

RELATED PCT APPLICATION NUMBER: PCT/US04/07568



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04-03-2359655-040777R

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# **PROVISIONAL APPLICATION FOR PATENT COVER SHEET**

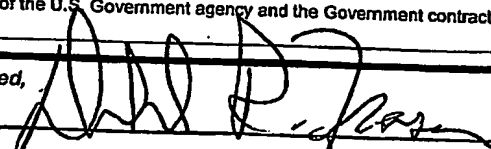
This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EU748999789US

PTO  
607459655

INVENTOR(S)					
Given Name (first and middle [if any])		Family Name or Surname		Residence (City and either State or Foreign Country)	
Donald W. Daniel L.		HAYWARD WITHAM		Waterville, Ohio Maumee, Ohio	
<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (500 characters max)					
METHOD FOR TREATING RECYCLED POLYETHYLENE TEREPHTHALATE CONTAINING MELTING CONTAMINANTS					
Direct all correspondence to:					
<input checked="" type="checkbox"/> Customer Number		CORRESPONDENCE ADDRESS			
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Address		PATENT TRADEMARK OFFICE			
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Number of Pages		8		<input type="checkbox"/> CD(s) Number	
<input type="checkbox"/> Drawing(s) Number of Sheets				<input checked="" type="checkbox"/> Other (specify)	
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76				ASSIGNMENT <input checked="" type="checkbox"/>	
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE AMOUNT (\$)	
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees					
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number		50-0577			
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.				\$80.00	
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input checked="" type="checkbox"/> No.					
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Respectfully submitted,

SIGNATURE 

Date 04/02/2003

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(if appropriate)  
Docket Number: 1-36904

## **USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT**

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C.

60459655 .040203

**CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10)**

Applicant(s): Donald W. Hayward et al.

Docket No.

1-36904

Serial No.

Filing Date

Examiner

Group Art Unit

Invention:

**METHOD FOR TREATING RECYCLED POLYETHYLENE TEREPHTHALATE CONTAINING  
MELTING CONTAMINANTS**

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Provisional Patent Application

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TITLE

METHOD FOR TREATING RECYCLED POLYETHYLENE TEREPHTHALATE  
CONTAINING MELTING CONTAMINANTS

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FIELD OF THE INVENTION

This invention relates generally to a process for treating recycled polyethylene terephthalate (RPET) containing contaminants. More particularly, the invention is directed to a process for treating  
10 contaminated RPET, so that the small amounts of melting contaminants contained in the RPET flakes have a negligible effect on the article ultimately produced from the RPET melt.

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BACKGROUND OF THE INVENTION

Post-consumer processing of recycled PET to manufacture a variety of low-tech consumer products such as flower pots and fence posts is well-known. Typically, the recycling process utilizes used PET  
20 containers, such as discarded carbonated beverage containers, which are collected, sorted, washed, and separated from contaminants to yield a relatively clean source of RPET. Additionally, the manufacture of imperfect and damaged molded PET products, particularly  
25 the blow molded bottles used for containing consumer goods, results in a considerable amount of PET waste which the manufacturers of such products would like to reuse. The RPET produced by conventional recycling processes is generally in ground or flake form, which is  
30 thereafter melt processed or further pelletized by the

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end user.

RPET is generally subjected to a grinding operation in order to make the material easier to handle and process. Conventional grinding equipment reduces the RPET to about 3/8 inch particles or flakes. The grinding is conducted in a manner to insure that a consistent flake size will be produced, by employing a grate or screen through which the ground material must pass upon exiting the grinder. Although conventional RPET flakes melt processing and pelletizing equipment is designed to handle 3/8 inch flakes, some RPET materials having sizes as large as 1/2 inch and as small as 1/4 inch are also commercially produced. The bulk density of 3/8 inch flake RPET generally ranges from about 22 to about 35 pounds per cubic foot.

Due to the nature of the recycling process, numerous polymeric contaminants are typically found in RPET flakes. These contaminants may be classified generally as either melting or non-melting contaminants. Melting contaminants are those which melt at or below the melting temperature of polyethylene terephthalate (PET), while non-melting contaminants are those which melt at temperatures above the melt temperature of PET. Examples of melting contaminants include PVC, Nylon, Polyethylene, Polypropylene, EVOH, Polystyrene, and the like.

It is known that melting contaminants degrade rapidly in the RPET melt stream of, for example, a melt extruder. Melting contaminants often cause yellowing and a loss of intrinsic viscosity in the RPET plastic

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stream. Likewise, such contaminants often form discrete areas of very dark inclusions or gels within the RPET plastic matrix.

It would be desirable to treat contaminated RPET, so that small amounts of melting contaminants would have only a negligible effect on RPET melting operations.

#### SUMMARY OF THE INVENTION

Accordant with the present invention, a process for treating RPET flakes which contain melting contaminants, so that the melting contaminants have only a negligible effect during the RPET melting and forming operations, has surprisingly been discovered. The process comprises providing a quantity of RPET flakes having melting contaminants, comminuting the RPET flakes to prepare RPET particles having an average mean particle size less than about 300 microns, melting the RPET particles to prepare an RPET melt, and mixing the RPET melt.

The inventive process is particularly useful for preparing a polymer melt from RPET flakes, which melt is ultimately used for the processing and forming of, for example, plastic containers.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is directed to a process for treating RPET flakes, comprising providing a quantity of RPET flakes having melting contaminants, comminuting the RPET flakes to prepare RPET particles having an average mean particle size less than about 300 microns, melting

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the RPET particles to prepare an RPET melt, and mixing the RPET melt.

By the term "RPET flakes" as it is used herein is meant generally the commercially available recycled polyethylene terephthalate materials produced by conventional PET recycling methods, usually in flake form, but which may additionally be in the form of chunks, spheres, pellets, and the like, and which are generally made available in bulk in a substantially uniform particle size from about  $\frac{1}{4}$  inch to about  $\frac{1}{2}$  inch.

According to the present invention, a quantity of RPET flakes containing melting contaminants is provided for further processing. The quantity of RPET flakes provided in the initial step of the inventive process may easily be determined by a routineer in the art of polymer processing, depending upon the quantity of polymer melt desired for further processing.

According to the present invention, the RPET flakes are comminuted by any conventional means to prepare RPET particles having an average mean particle size less than about 300 microns.

Following comminution of the RPET flakes, the resultant RPET particles are melted by conventional means such as, for example, by adding the neet or pelletized RPET particles to a melt extruder, or to a high shear device.

Finally, the RPET melt is thoroughly mixed together by conventional means. Conveniently, if a melt extruder or high shear device is used in the previous step, the mixing will occur simultaneously with either of those

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operations..

This polymer blend component is beneficial for combining with other polymer materials for subsequent melt processing and forming operations. For example, 5 the addition of the inventive RPET melt to a quantity of virgin polyethylene terephthalate will extend the volume of the virgin PET.

If an RPET melt were prepared directly from the original RPET flakes, the resultant melt would be 10 considered unusable or of low quality. The inventive process, however, converts this erstwhile useless RPET material into a higher grade of RPET which may be useful even for the manufacture of food grade containers.

The process for treating RPET flakes containing 15 melting contaminants described hereinabove is generally disclosed in terms of its broadest application to the practice of the present invention. Occasionally, the process conditions as described may not be precisely applicable to each RPET/contaminant combination included 20 within the disclosed scope. Those instances where this occurs, however, will be readily recognized by those ordinarily skilled in the art. In all such cases, the process may be successfully performed by conventional modifications to the disclosed method.

25 The invention is more easily comprehended by reference to specific embodiments recited hereinabove which are representative of the invention. It must be understood, however, that the specific embodiments are provided only for the purpose of illustration, and that 30 the invention may be practiced otherwise than as



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specifically illustrated without departing from its  
spirit and scope.

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## WHAT IS CLAIMED IS:

1. A process for treating RPET flakes, comprising:
  - providing a quantity of RPET flakes having  
5 melting contaminants;  
comminuting the RPET flakes to prepare RPET  
particles having an average mean particle size less  
than about 300 microns;  
10 melting the RPET particles, to prepare an RPET  
melt; and  
mixing the RPET melt.

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ABSTRACT

A process for treating RPET flakes comprises providing a quantity of RPET flakes having melting contaminants, comminuting the RPET flakes to prepare  
5 RPET particles having an average mean particle size less than about 300 microns, melting the RPET particles to prepare an RPET melt, and mixing the RPET melt.

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